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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/523,804

02/09/2005

Jae Sung Lee

1751-373

6175

6449

7590

05/08/2007

ROTHWELL, FIGG, ERNST & MANBECK, P.C.

1425 K STREET, N.W.

SUITE 800

WASHINGTON, DC 20005

EXAMINER

VANOY, TIMOTHY C

ART UNIT

PAPER NUMBER

1754

NOTIFICATION DATE

DELIVERY MODE

05/08/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

## Office Action Summary

Application No.

10/523,804

Applicant(s)

LEE ET AL.

Examiner

Timothy C. Vanoy

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☒ Claim(s) 12,31 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>Nov. 2, 2006</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Objections***

- a) In claim 12 line 2, "any of" should be deleted.
- b) In claim 31 line 2, it appears that "aluminum" should be replaced with --alumina--.
- c) Claim 32 is improperly dependent on its self.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 13, 20 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a) In claims 1, 13 and 20, the phrase "with added water" in these claims raise the question of whether or not the "added water" is the water already present in the mixture which was added in the previous step "adding water to the mixture" or (alternatively) if the "added water" is supplemental or additional water added in addition to the water added in the previous step. It is suggested to either insert --the-- between "with" and "added" (if the water being referred to is the water already present in the mixture) or

Art Unit: 1754

insert --additional-- between "with" and "added" (if the water being added simply supplements the water previously added in the "adding water to the mixture" step).

b) Claim 24 does not particularly point out what the "alumina precursor" is being compared to in defining the mole fraction. That is, claim 24 is incomplete.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S.

Pat. 5,795,559 to Pinnavaia et al.

Col. 18 ln. 46 to col. 19 ln. 5 in U. S. Pat. 5,795,559 describes a method for making a mesoporous alumina molecular sieve, comprising:

providing a solution containing surfactant (i. e. polyethylene oxide - polypropylene oxide co-polymer surfactant), aluminum tri-sec-butoxide and sec-butanol;

adding a solution containing water and sec-butanol to the solution containing surfactant, aluminum tri-sec-butoxide and sec-butanol;

allowing an ambient temperature hydrolysis of the aluminum tri-sec-butoxide to proceed;

drying the powder resulting from the mixture at room temperature for 16 hours and then drying the powder at 373 °K for 6 hours, and

calcining the powder at 773 °K for 4 hours to remove any remaining template - thereby producing the mesoporous alumina molecular sieve.

Claims 13-33 are rejected under 35 U.S.C. 102(b) as being anticipated by the reference titled "Surfactant-Driven Synthesis of Individual Alumina Nanotubes and Bundles of Lithium Aluminate Subnanotubes with High Hydrogen Storage Capacity and Lithium Ion Mobility" by Jae Sung Lee et al. *Symposium for Nano Chemical Processing*.

On the 2<sup>nd</sup> page of this Lee article, under the section titled "Experimental", there is described a synthetic method of manufacturing a lithium-containing alumina nanotube useful for storing hydrogen (please see 4<sup>th</sup> full paragraph on the 2<sup>nd</sup> page of this Lee et al. article), by subjecting a surfactant (cetyltrimethylammonium bromide); aluminum tri-sec-butoxide and LiOH to a hydrothermal reaction (by using an extension of the procedure that they used to prepare mesoporous alumina molecular sieves: please see the 3<sup>rd</sup> full paragraph on the 2<sup>nd</sup> page of this Lee et al. article). The product was washed, dried and then calcined to produce the alumina nanotube product.

Claims 13-30 are rejected under 35 U.S.C. 102(b) as being anticipated by the article titled "Surfactant driven synthesis of pure and lithium inseted alumina nanotubes" by Jae Sung Lee et al., Apr. 19, 2002, 1 page.

This Lee et al. article reports that enthusiastic attention has been paid to the preparation and potential applications of various inorganic hollow nanotube materials. Here we report a surfactant-driven hydrothermal process for the synthesis of individual

Art Unit: 1754

alumina nanotubes. The resulting alumina nanotube could be further derivatized by inserting lithium into the tube, making the material promising for the applications such as energy storage/conversion, etc.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The person having ordinary skill in the art has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over by the article titled "Surfactant driven synthesis of pure and lithium inseted alumina nanotubes" by Jae Sung Lee et al., Apr. 19, 2002, 1 page. (hence "Lee-1") in view of the reference titled "Surfactant-Driven Synthesis of Individual Alumina Nanotubes and Bundles of Lithium Aluminate Subnanotubes with High Hydrogen Storage Capacity and Lithium Ion Mobility" by Jae Sung Lee et al. *Symposium for Nano Chemical Processing* (hence "Lee-2").

This Lee-1 et al. article reports that enthusiastic attention has been paid to the preparation and potential applications of various inorganic hollow nanotube materials. Here we report a surfactant-driven hydrothermal process for the synthesis of individual alumina nanotubes. The resulting alumina nanotube could be further derivatized by inserting lithium into the tube, making the material promising for the applications such as energy storage/conversion, etc.

The difference between the applicants' claims and the Lee-1 reference is that applicants' claims 31-33 call for using the lithium-containing alumina nanotube as a hydrogen storage material.

On the 2<sup>nd</sup> page of this Lee-2 article, under the section titled "Experimental", there is described a synthetic method of manufacturing a lithium-containing alumina nanotube useful for storing hydrogen (please see 4<sup>th</sup> full paragraph on the 2<sup>nd</sup> page of

Art Unit: 1754

this Lee et al. article), by subjecting a surfactant (cetyltrimethylammonium bromide); aluminum tri-sec-butoxide and LiOH to a hydrothermal reaction (by using an extension of the procedure that they used to prepare mesoporous alumina molecular sieves: please see the 3<sup>rd</sup> full paragraph on the 2<sup>nd</sup> page of this Lee et al. article). The product was washed, dried and then calcined to produce the alumina nanotube product.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the lithium-containing alumina nanotube of the Lee-1 reference for storing hydrogen, as set forth in applicants' claims 31-33, because the disclosure set forth in the Lee-2 reference teaches the use of such lithium-containing alumina nanotubes for storing hydrogen.

The following references are made of record:

U. S. Pat. 6,214,312 B1 disclosing a process for synthesizing aluminas in a basic medium;

U. S. Pat. 5,863,515 disclosing a mesoporous alumina and a process for its manufacture, and

JP 2006-188,385 A disclosing a single crystal and alpha alumina nanotube and a method for producing the same.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 571-272-8158. The examiner can normally be reached on Mon-Fri 8-4:30.



Art Unit: 1754

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*Timothy C Vandy*  
Timothy C Vandy  
Primary Examiner  
Art Unit 1754

tv